

## Catalyst 3512 XL, 3524, and 3548 XL Stackable 10/100 and Gigabit Ethernet Switches

THE CATALYST® 3512 XL, 3524 XL, AND 3548 XL SWITCHES ARE MEMBERS OF THE CISCO SYSTEMS CATALYST 3500 SERIES XL, A SCALABLE LINE OF STACKABLE 10/100 AND GIGABIT ETHERNET SWITCHES THAT DELIVERS PREMIUM PERFORMANCE, MANAGEABILITY, AND FLEXIBILITY WITH UNPARALLELED INVESTMENT PROTECTION. WITH A 10.8-Gbps SWITCHING FABRIC AND A MAXIMUM 8.0-MILLION-PACKET-PER-SECOND FORWARDING RATE, THESE SWITCHES ARE IDEAL FOR CREATING HIGH-PERFORMANCE LOCAL-AREA NETWORKS. THE CATALYST 3512 XL, 3524 XL, AND 3548 XL OFFER CUSTOMERS TREMENDOUS BENEFITS THROUGH GIGABIT ETHERNET-BASED CONFIGURATION OPTIONS, THE NEW CISCO SWITCH CLUSTERING MULTIDEVICE MANAGEMENT ARCHITECTURE, AND INTEGRATED IP VOICE AND TELEPHONY SUPPORT.

The Catalyst 3512 XL switch has 12 10/100 switched ports and two Gigabit Interface Converter (GBIC)-based Gigabit Ethernet ports; the Catalyst 3524 XL has 24 10/100 ports and two GBIC-based Gigabit Ethernet ports; and the Catalyst 3548 XL has 48 10/100 ports and two GBIC-based Gigabit Ethernet ports. The built-in Gigabit Ethernet ports accommodate a range of GBIC transceivers, including the Cisco GigaStack™ GBIC, and 1000BaseSX, 1000BaseLX/LH and 1000BaseZX GBICs. The dual GBIC-based Gigabit Ethernet implementation provides customers tremendous deployment flexibility—allowing customers to implement one type of stacking and uplink configuration today, while preserving the option to migrate that configuration in the future.

The Catalyst 3500 XL switches are ideal for providing desktop connectivity in a variety of network applications. The 12-port Catalyst 3512 XL offers low port density at a low entry price. Catalyst 3524 XL and Catalyst 3548 XL switches deliver dedicated 10- or 100-Mbps bandwidth to individual users and servers at a low per-port price. All three desktop switches have dual GBIC-based Gigabit Ethernet ports that provide an ultra-flexible and scalable solution for Gigabit Ethernet uplinks or GigaStack GBIC stacking solutions. The switches are easy to deploy, either on a desktop or in a wiring closet, and feature Cisco IOS® software support. Administration of Cisco desktop Catalyst switches is made even more convenient using the Cisco Switch Clustering multidevice management technology.

Figure 1 The Catalyst 3512 XL, Catalyst 3524 XL, and Catalyst 3548 XL are autosensing 10/100 switches for creating high-performance LANs. The switches provide 12, 24, or 48 10/100 ports and two built-in GBIC-based Gigabit Ethernet ports with up to 8.0 million packets per second performance.



### Flexible Stacking with the GigaStack GBIC

The Catalyst 3500 series XL and Gigabit Ethernet-enabled Catalyst 2900 series XL switches can be stacked using the low-cost Cisco GigaStack™ GBIC. The two-port GigaStack GBIC offers a range of highly flexible stacking and performance options. Customers can deploy a 1-Gbps independent stack backplane in a cascade configuration, or scale up to 5-Gbps of bandwidth in a star configuration using the Catalyst 3508G XL Gigabit Ethernet aggregation switch. Network managers may use one or both of the available GBIC ports to create high-speed uplinks to the network core, using standard Gigabit Ethernet or Gigabit EtherChannel® technology. High levels of stack resiliency can also be implemented by deploying dual redundant Gigabit

Ethernet Uplinks, a redundant GigaStack loopback cable, Uplink Fast for high-speed uplink failover, and per VLAN Spanning Tree (PVST+) for uplink load balancing. This Gigabit Ethernet flexibility makes the Catalyst 3500 series XL an ideal LAN edge complement to the Cisco Catalyst 6500 family of Gigabit Ethernet optimized core LAN switches.

### Cisco Switch Clustering

Breakthrough Cisco Switch Clustering technology enables up to 16 interconnected Catalyst 3500 XL, Catalyst 2900 XL, and Catalyst 1900 switches, regardless of geographic proximity, to form a single IP management domain. Cisco Switch Clustering supports a broad range of standards-based connectivity options and configurations to deliver levels of performance that are scalable to meet customer requirements. Switch Cluster connectivity options for the Catalyst 3500 series XL include Ethernet, Fast Ethernet, Fast EtherChannel, low-cost Cisco GigaStack GBIC, Gigabit Ethernet, and Gigabit EtherChannel connectivity. Because the technology is not limited by proprietary stacking modules or stacking cables, Cisco Switch Clustering expands the traditional stacking domain beyond a single wiring closet and lets users mix and match interconnections to meet specific management, performance, and cost requirements.

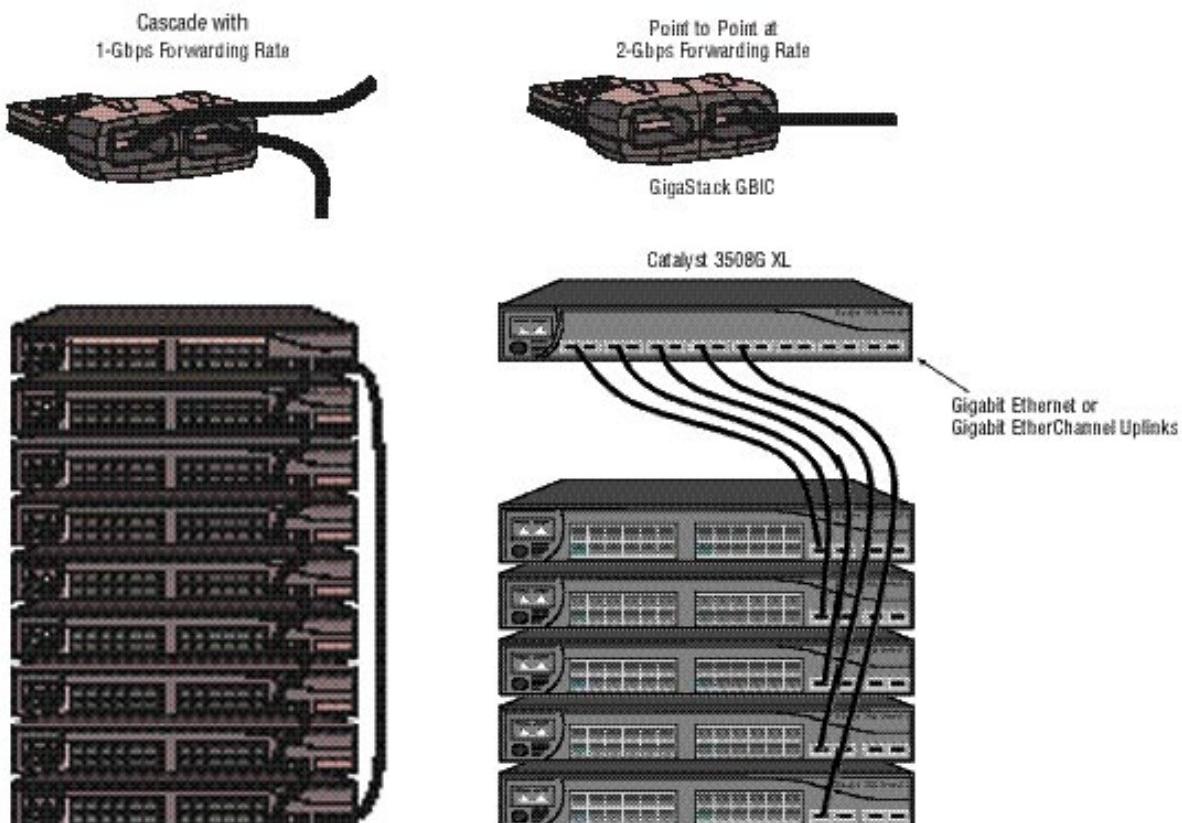
Catalyst 3500 XL switches can be configured either as command

or member switches in a Cisco switch stack or cluster. The command switch serves as the single IP address management point and disburses all management instructions dictated by the network administrator. Command switches can cluster up to 15 additional interconnected member switches regardless of interconnection media.

### Quality of Service

All Catalyst 3500 series XL switches support LAN edge quality of service (QoS) based on IEEE 802.1p class of service (CoS), as well as port-based prioritization. CoS is used for tagged packets while port-based prioritization is used for untagged packets. Priority scheduling is applied between the queues, which will assure that the high priority queue is always serviced before scheduling the low priority traffic. These features enable users to prioritize mission critical traffic, such as VoIP and ERP applications over regular traffic (such as FTP or generic Web traffic).

Figure 2 Customers can start with a low-cost GigaStack GBIC-based 1-Gbps independent stack backplane. At any point, users have the option to increase their stack performance to 5-Gbps using the same GigaStack GBICs in combination with the high-performance Catalyst 3508G XL Gigabit Ethernet aggregation switch.



### **Software Management Features**

Cisco Catalyst 3500 series XL switches include several exceptional features to increase network performance, manageability, and security. In order to boost performance, Fast EtherChannel and Gigabit EtherChannel technology offer from 400-Mbps to 4-Gbps high-performance bandwidth between Catalyst switches, routers, and servers. The Cisco Group Management Protocol (CGMP) enhances performance of multimedia applications and reduces network traffic by allowing a switch to selectively and dynamically forward IP multicast traffic to targeted end stations.

Users can also implement higher levels of data security and boost LAN performance by deploying up to 250 virtual LANs (VLANs) per switch. This ensures that data packets are forwarded only to stations within a specific VLAN, creating a virtual firewall between groups of ports on the network and reducing broadcast transmission. VLAN trunks can be created from any port using either 802.1Q trunking or the Cisco Inter-Switch Link (ISL) VLAN architecture. VLANs using standards-based 802.1Q and ISL trunking provide broadcast control and enhanced security, and simplify adds, moves, and changes. Per VLAN Spanning Tree (PVST+) allows users to implement redundant uplinks while also distributing traffic loads across multiple links—not possible with standard STP implementations. Cisco Uplink Fast technology ensures immediate transfer to the secondary uplink, enhancing overall network stability and reliability.

With the Catalyst 3500 series XL, network managers can implement high levels of port and console security. Media access control (MAC) address-based port level security prevents unauthorized stations from accessing the switch. Multilevel access security on the switch console prevents unauthorized users from accessing or altering switch configuration. Terminal access controller access control system (TACACS+) authentication enables centralized access control of the switch and restricts unauthorized users from altering the configuration.

### **Key Features/Benefits**

#### **Exceptional Performance**

- Twelve, 24, or 48 10BaseT/100BaseTX autosensing ports, each delivering up to 200 Mbps of bandwidth to individual users, servers, or workgroups to support bandwidth-intensive applications
- Two built-in, GBIC-based Gigabit Ethernet ports, delivering up to 4-Gbps aggregated bandwidth to Gigabit Ethernet backbones, Gigabit Ethernet servers, or between switches

- 10.8-Gbps switching fabric and up to a 8.0-million-packets-per-second forwarding rate, ensuring high performance forwarding to each 10BaseT/100BaseTX and Gigabit Ethernet port
- 4-MB shared memory architecture, ensuring the highest-possible throughput with a design that eliminates head-of-line blocking, minimizes packet loss, and delivers better overall performance in environments with extensive multicast and broadcast traffic
- Full-duplex operation on all ports, delivering up to 200 Mbps on 10/100 ports or 2-Gbps on 1000BaseX ports
- Dual-priority forwarding queues on each 10/100 and Gigabit Ethernet ports, enabling network traffic prioritization and seamless data, voice, and video integration through IEEE 802.1p protocol
- Bandwidth aggregation through Fast EtherChannel and Gigabit EtherChannel technologies, enhancing fault tolerance and offering from 400-Mbps to 4-Gbps of aggregated bandwidth between switches, and to routers and individual servers
- GigaStack GBIC delivers a low-cost, independent stack bus with a 1-Gbps forwarding bandwidth in a daisy-chain configuration, with up to nine Catalyst 3500 XL or gigabit-enabled Catalyst 2900 series XL switches or a 2-Gbps forwarding rate in a point-to-point configuration
- GBIC-based Gigabit Ethernet ports give customers a choice of 1000BaseSX, 1000BaseLX/LH, 1000BaseZX or Cisco GigaStack stacking GBICs to fit their connection needs
- Per-port broadcast storm control prevents faulty end stations from degrading overall system performance with broadcast storms

#### **Flexible and Scalable Switch Clustering Architecture**

- Cisco Switch Clustering technology allows a user to manage up to 16 interconnected Catalyst 3500 XL, 2900 XL, and Catalyst 1900 switches through a single IP address regardless of location
- Cluster management is ensured in the rare event of command switch failure via a failover scheme that runs automatically (enabled in March '00 software release)

#### **Ease of Use and Ease of Deployment**

- Cluster software administration feature allows the network manager to quickly and easily upgrade the system software on a group of Catalyst 3500 XL, 2900 XL, and Catalyst 1900 switches

- IEEE 802.3z-compliant 1000BaseSX, 1000BaseLX/LH, and 1000BaseZX physical interface support through a field-replaceable GBIC module provides customers unprecedented flexibility in switch deployment
- Autosensing on each port detects attached device speed and automatically configures the port for 10- or 100-Mbps operation, easing the deployment of the switch in mixed 10BaseT and 100BaseTX environments
- Autonegotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth
- Autoconfiguration eases switch deployment in the network by automatically configuring multiple switches across a network via a boot server
- Default configuration stored in Flash memory ensures that a switch can be quickly connected to the network and can pass traffic with minimal user intervention, preserving configuration in case of a power outage

#### **Integrated Cisco IOS Switching Solution**

- Cisco Group Management Protocol (CGMP) enables a switch to selectively and dynamically forward routed IP multicast traffic to targeted multimedia end stations, reducing overall network traffic
- CGMP Fast Leave allows end stations to quickly exit from a multicast session, reducing superfluous network traffic
- Virtual LAN trunks can be created from any port using either standards-based 802.1Q tagging or the Cisco ISL VLAN architecture
- IEEE 802.1p Layer 2 protocol for prioritization of mission critical and time sensitive traffic from data, voice, and telephony applications
- Cisco Virtual Trunking Protocol (VTP) supports dynamic VLANs and trunk configuration across all switches
- Cisco IOS Command-line interface (CLI) support provides common user interface and command set across all Catalyst series switches and Cisco routers
- Cisco Discovery Protocol (CDP) enables a CiscoWorks network management station to automatically discover a switch in a network topology

#### **Superior Manageability**

- Built-in Web-based management interface provides easy-to-use management through a standard browser such as Netscape Navigator or Microsoft Explorer

- Simple Network Management Protocol (SNMP) and Telnet interface support deliver comprehensive in-band management, and a CLI-based management console provides detailed out-of-band management
- Manageable through CiscoWorks2000 network management software on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs
- 8 MB DRAM and 4 MB Flash memory onboard, enabling the addition of a continuous stream of feature upgrades and maximizing customer investments
- Configurable network port, supporting unlimited MAC addresses for backbone connectivity
- Embedded Remote Monitoring (RMON) software agent supports four RMON groups (History, Statistics, Alarms, and Events) for enhanced traffic management, monitoring, and analysis
- Support for all nine RMON groups through use of a switch port analyzer (SPAN) port that permits traffic monitoring of a single port, a group of ports, or the entire switch from a single network analyzer or RMON probe
- Domain Name System (DNS) client support provides IP address resolution with user-defined device names
- Trivial File Transfer Protocol (TFTP) reduces the cost of administering software upgrades by downloading from a centralized location
- Network Time Protocol (NTP) provides an accurate and consistent timestamp to all switches within the intranet
- Multifunction LEDs per port for port status, half-duplex/full-duplex, and 10BaseT/100BaseTX indication, as well as switch-level status LEDs for system, redundant power supply (RPS), and bandwidth utilization provide a comprehensive and convenient visual management system

#### **Security and Redundancy**

- Cisco Uplink Fast technology ensures quick failover recovery, enhancing overall network stability and reliability
- Support for TACACS+ authentication enables centralized control of the switch and restricts unauthorized users from altering the configuration
- MAC-based port-level security prevents unauthorized stations from accessing the switch
- User-selectable address learning mode simplifies configuration and enhances security
- Multilevel security on console access prevents unauthorized users from altering switch configurations

- IEEE 802.1D Spanning-Tree Protocol support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance
- Support for a redundant loopback cable connecting the top and bottom switches in a GigaStack stack
- Support for optional Cisco 600-watt redundant AC power system provides a backup power source for up to four units for improved fault tolerance and network uptime

## Technical Specifications

### Performance

- 10.8-Gbps switching fabric
- 4.8 Mpps wire-speed forwarding rate for 64-byte packets (Catalyst 3512 XL), 6.5 million pps wire-speed forwarding rate for 64-byte packets (Catalyst 3524 XL), 8.0 Mpps forwarding rate for 64-byte packets (Catalyst 3548 XL)
- 5.4-Gbps maximum forwarding bandwidth
- 4 MB memory architecture shared by all ports
- 8 MB DRAM (Catalyst 3512 XL and 3524 XL) and 4 MB Flash memory
- 16 MB DRAM (Catalyst 3548 XL) and 4 MB Flash memory
- 8192 MAC addresses

### Management

- SNMP Management Information Base (MIB) II, SNMP MIB extensions, Bridging MIB (RFC 1493)

### Standards

- IEEE 802.3x full duplex on 10BaseT, 100BaseTX, and 1000BaseX ports
- IEEE 802.1D Spanning-Tree Protocol
- IEEE 802.1p CoS Prioritization
- IEEE 802.1Q VLAN
- IEEE 802.3z 1000BaseX specification
- 1000BaseX (GBIC)
  - 1000BaseSX
  - 1000BaseLX/LH
  - 1000BaseZX
- IEEE 802.3u 100BaseTX specification
- IEEE 802.3 10BaseT specification

### Y2K

- Y2K compliant

### Connectors and Cabling

- 10BaseT ports: RJ-45 connectors; two-pair category 3, 4, or 5 unshielded twisted-pair (UTP) cabling

- 100BaseTX ports: RJ-45 connectors; two-pair Category 5 UTP cabling
- 1000BaseX GBIC ports: SC fiber connectors, single mode or multimode fiber
- GigaStack GBIC ports: copper-based Cisco GigaStack cabling
- Management console port: RJ-45 connector, RS-232 serial cabling

### Indicators

- Per-port status LEDs—link integrity, disabled, activity, speed, and full-duplex indications
- System status LEDs—system, RPS, and bandwidth utilization indications

### Dimensions and Weight (H x W x D)

- 1.75 x 17.5 x 11.8 in (4.4 x 44.5 x 30 cm) (Catalyst 3512 XL and 3524 XL)
- 1.75 x 17.5 x 15.3 in (4.4 x 44.5 x 39 cm) (Catalyst 3548 XL)
- One rack-unit (RU) high
- 10.25 lb (4.6 kg) (Catalyst 3512 XL and 3524 XL)
- 11 lb (5.01 kg) (Catalyst 3548 XL)

### Environmental Conditions and Power Requirements

- Operating temperature: 32 to 113 F (0 to 45 C)
- Storage temperature: -13 to 158 F (-25 to 70 C)
- Operating relative humidity: 10 to 85% noncondensing
- Operating altitude: Up to 10,000 ft (3000 m)
- Power consumption: 70W maximum (Catalyst 3512 XL and 3524 XL); 100W maximum (Catalyst 3548 XL); 239 BTU per hour
- AC input voltage/frequency: 100 to 120/200 to 240 VAC (autoranging) 50 to 60 Hz
- MTBF 150,000 hours (Catayst 3512 and 3524 XL)
- MTBF 135,000 hours (Catalyst 3548 XL)

### Safety Certifications

- UL 1950
- CSA 22.2 No. 950
- EN 60950
- IEC 950
- AS/NZS 3260, TS001
- CE Marking
- TUV

### Electromagnetic Emissions Certifications

- FCC Part 15 Class A
- EN 55022b Class A (CISPR 22 Class A)
- VCCI Class A

- AS/NZS 3548 Class A
- BCIQ
- CE Marking

#### **Warranty**

- Lifetime limited warranty



#### **Ordering Information**

##### **Model Numbers**

- WS-C3512-XL-A (12-port 10/100 + two-port 1000BaseX, Standard Edition)
- WS-C3512-XL-EN (12-port 10/100 + two-port 1000BaseX, Enterprise Edition)
- WS-C3524-XL-A (24-port 10/100 + two-port 1000BaseX, Standard Edition)
- WS-C3524-XL-EN (24-port 10/100 + two-port 1000BaseX, Enterprise Edition)

- WS-C3548-XL-A (48-port 10/100 + two-port 1000BaseX, Standard Edition)
- WS-C3548-XL-EN (48-port 10/100 + two port 1000BaseX, Enterprise Edition)

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